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(54) Title: **SELF ADAPTIVE CEMENT SYSTEMS**

(57) Abstract: A self-healing cement system includes cement, water and at least one additive that swells in contact with water from reservoir or from formation in the case of a structural failure in the set cement to provide a physical barrier in the zone of failure. Examples of such material include particles of super-absorbent polymer. These additives have the effect of making the cement self-healing in the event of physical failure or damage such as micro-annuli. The self healing property is produced by the contact of the water itself, the potential repair mechanism is thus activated if and when needed in case of start of loss of zonal isolation. Several super-absorbent polymers have been identified such as polyacrylamide, modified crosslinked poly(meth)acrylate and non-solute acrylic polymers.

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